

the other features in accordance with the invention.

Other embodiments will occur to those skilled in the art and are within the following claims:

What is claimed is:

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For: Flaw Detection System Using Acoustic Doppler Effect

1 1. A flaw detection system using acoustic Doppler effect for detecting
2 flaws in a medium wherein there is relative motion between the medium and system
3 comprising:

4 transducer means, spaced from the medium to be inspected, for
5 introducing to and sensing from the medium an acoustic signal that propagates in said
6 medium at a predetermined frequency; and

7 means, responsive to the sensed propagating acoustic signal, for
8 detecting in the sensed acoustic signal the Doppler shifted frequency representative of a
9 flaw in the medium.

10 2. The flaw detection system using acoustic Doppler effect of claim
11 1 in which said transducer means includes a separate transmitter and receiver.

12 3. The flaw detection system using acoustic Doppler effect of claim
13 1 in which said transducer means is an ultrasonic transducer and said acoustic signal is
14 an ultrasonic signal.

15 4. The flaw detection system using acoustic Doppler effect of claim
16 1 in which said transducer transmits an acoustic signal for propagation in said medium.

1 11. The flaw detection system using acoustic Doppler effect of claim
2 1 in which said means for detecting includes a bandpass filter and a peak detector for
3 distinguishing the Doppler effect frequency.

1 12. The flaw detection system using acoustic Doppler effect of claim
2 11 in which said means for detecting includes a thresholding circuit for identifying a
3 preselected level as a flaw.

1 13. The flaw detection system using acoustic Doppler effect of claim
2 1 in which said means for detecting includes an A/D converter and a digital filter for
3 distinguishing the Doppler effect frequency, and a thresholding circuit for identifying a
4 preselected level as a flaw.

1 14. The flaw detection system using acoustic Doppler effect of claim
2 1 in which said medium is a railroad rail.

1 15. The flaw detection system using acoustic Doppler effect of claim
2 1 in which said transducer means transmits to the surface of the medium and receives
3 from the surface of the medium an acoustic signal and the flaws detected are surface
4 flaws.

1 16. The flaw detection system using acoustic Doppler effect of claim
2 1 in which said transducer means induces an acoustic signal internally in the medium and
3 the flaws detected are internal flaws.

1 17. The flaw detection system using acoustic Doppler effect of claim
2 1 in which said transducer means includes a laser vibrometer interferometer for sensing
3 the acoustic signal propagating in the medium.

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1 18. A flaw detection system using acoustic Doppler effect for detecting
2 surface flaws in a medium wherein there is relative motion between the medium and
3 system comprising:

4 acoustic transducer means, spaced from the medium to be
5 inspected, for transmitting an acoustic signal to and receiving the reflected acoustic signal
6 at a predetermined frequency from the surface of the medium to be inspected; and

7 means, responsive to the reflected acoustic signal, for distinguishing
8 the Doppler shifted frequency in the reflected acoustic signal from the predetermined
9 frequency of the transmitted acoustic signal representative of a surface flaw in the
10 medium.

1 19. A flaw detection system using acoustic Doppler effect for detecting
2 flaws in a medium wherein there is relative motion between the medium and system
3 comprising:

4 transducer means, spaced from the medium to be inspected, for
5 inducing an acoustic signal to propagate in the medium at a predetermined frequency and
6 sensing the propagating acoustic signal in the medium; and

7 means, responsive to the sensed propagating acoustic signal, for
8 distinguishing the Doppler shifted frequency representative of a flaw in the medium.

1 20. The flaw detection system using acoustic Doppler effect for
2 detecting flaws of claim 19 in which said transducer means includes an electromagnetic
3 acoustic transducer for inducing and sensing the acoustic signal.

4 21. The flaw detection system using acoustic Doppler effect for
5 detecting flaws of claim 19 in which said transducer means includes a transmitter and a
6 receiver and said transmitter includes a laser for locally heating the medium to generate
7 acoustic signals.